



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/762,526 | 01/23/2004 | Chang Won Choi | 2557-000177/US | 5346 |

30593 7590 09/11/2008
HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 8910
RESTON, VA 20195

| |
|----------|
| EXAMINER |
|----------|

LUND, JEFFRIE ROBERT

| | |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

1792

| | |
|-----------|---------------|
| MAIL DATE | DELIVERY MODE |
|-----------|---------------|

09/11/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | | |
|------------------------------|------------------------|--|---------------------|--|
| Office Action Summary | Application No. | | Applicant(s) | |
| | 10/762,526 | | CHOI ET AL. | |
| | Examiner | | Art Unit | |
| | Jeffrie R. Lund | | 1792 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 May 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) 40-43 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-39 and 44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 August 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>11/30/07</u> . | 6) <input type="checkbox"/> Other: _____. |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claim 44 is rejected under 35 U.S.C. 102(b) as being anticipated by Koshiishi et al, US Patent 5,919,332.

Koshiishi et al teaches an insulating plate 31 that includes a protrusion protruding outwardly in a direction parallel to a radial direction of the body with a sloped surface and a cliff surface. (Figure 1)

3. Claim 44 is rejected under 35 U.S.C. 102(b) as being anticipated by Fujimoto, US Patent 5,413,673.

Fujimoto teaches an insulating plate 40, 42 that includes a protrusion protruding outwardly in a direction parallel to a radial direction of the body with a sloped surface and a cliff surface. (Entire document, specifically, Figure 5B and 5C)

4. Claim 44 is rejected under 35 U.S.C. 102(e) as being anticipated by Berman et al, US Patent 6,837,967 B1.

Berman et al teaches an insulating plate 120 includes a protrusion protruding outwardly in a direction parallel to a radial direction of the body with a sloped surface

Art Unit: 1792

and a cliff surface. (Figure 1)

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-8 and 10-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Quon, US Patent Application Publication 2003/0150562 A1, in view of Berman et al, US Patent 6,837,967 B1.

Quon teaches a bottom electrode 20 arranged below the semiconductor wafer 14 and acting as a stage; a solid upper electrode 10 arranged above the semiconductor wafer; and insulating plate 80 arranged adjacent to the solid plate upper electrode 10 with a gap therebetween; an ring type upper electrode (edge bead electrode) 30 above the wafer; and a lower edge electrode (edge bead electrode) 40. The gap is formed at the junction of the electrode and the insulating plate. The various electrodes are used to form the plasma. (Entire document, specifically, Figure 1)

Quon differs from the present invention in that Quon does not teach an insulating plate with protrusions with a cliff and sloped surface, and spaced from the substrate surface to prevent etching gas from flowing into the center and plasma forming over the center of the substrate, the insulating plate is replaceable with various sized insulating plates, or a grooves in the bottom electrode.

Berman et al teaches an insulating plate 120 includes a protrusion protruding

Art Unit: 1792

outwardly in a direction parallel to a radial direction of the body with a sloped surface and a cliff surface, the protrusions extend towards the surface of the wafer a distance such that a plasma or etching gases cannot reach the center of the wafer, and includes a chuck (with grooves) to hold the wafer.

The motivation for adding the insulating plate of Berman et al is to limit the etching of the wafer to the edge of the wafer.

The motivation for making the insulating plate various sizes is to control the size of the are etched. Furthermore, it has been held that making elements adjustable is obvious. (See *In re Stevens* 101 USPQ 148, and MPEP 2144)

The motivation for adding grooves in the lower electrode of Quon is to hold the wafer through the use of a vacuum chuck as taught by Berman et al.

Furthermore, it has been held that the simple substitution of one known element for another to obtain predictable results is obvious (see *KSR International Co. v. Teleflex Inc.*).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the insulating plate of Berman et al, make the insulating plate adjustable, and use grooves in the lower electrode to hold the wafer through the use of a vacuum chuck as taught by Berman et al.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Quon and Berman et al as applied to claims 1-8 and 10-39 above, and further in view Johnson, US Patent 2003/0201069 A1.

Quon and Berman et al differ from the present invention in that they do not teach

Art Unit: 1792

an isolator between the lower electrode and lower ring electrode.

Johnson teaches a lower electrode 175, a lower ring shaped electrode 210, and an isolator 174 that isolates the lower electrode from the lower ring shaped electrode. (Figure 1A and 1B)

The motivation for adding the isolator of Johnson to the apparatus of Quon and Berman et al is to isolate the lower electrode and lower ring type electrode to enable the independent control of the power supplied to each electrode.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add the isolator of Johnson to the apparatus of Quon and Berman et al.

Response to Arguments

8. Applicant's arguments filed May 16, 2008 have been fully considered but they are not persuasive.

In regard to the argument "The shape of the insulating plate is a structural feature, but not intended use" directed to Koshiishi et al, Fujimoto, and Berman et al, the Examiner disagrees. First, the Examiner has not made an intended use rejection. Second, the claimed structure is taught by Koshiishi et al, Fujimoto, and Berman et al. Third, the claimed intended use (i.e. guide gas away from a center portion of a semiconductor) is taught by Koshiishi et al, Fujimoto, and Berman et al in that they all guide gases away from the center portion. Fourth, the specific use of the insulating plate is an intended use of the apparatus and if to Koshiishi et al, Fujimoto, and Berman et al did not teach the use it would not define the invention over the art.

Art Unit: 1792

In regard to the argument that Koshiishi et al and Fujimoto do not teach guiding gas away from a center portion of a semiconductor wafer, the Examiner disagrees. The gas after being supplied to the center of the substrate as noted by the Applicant also guides the gas away from a center portion of a semiconductor. Thus, Koshiishi et al and Fujimoto discloses all of the claimed elements.

In regard to the argument:

"II. Berman fails to anticipate claim 44.

On page 5 of the Final Office Action, the Examiner dismisses Applicants' argument that FIGS. 2A-2D of Berman fail to teach or suggest the "insulating plate," of claim 44. In doing so, the Examiner directs Applicants attention instead to FIG. 1 of Berman. However, FIG. 1 of Berman, also fails to teach or suggest an insulating plate including, inter alia "a protrusion, including a sloped surface and a cliff surface, the protrusion protruding outwardly in a direction parallel to a radial direction of the body," as required by claim 44.

As shown in FIG. 1 of Berman (the relevant portion of which is reproduced below for the Examiner's convenience), cylindrically shaped top plate 120 has a plasma confining top magnetic coil 122 located at its periphery. Berman at col. 5, 11. 58 - 60 and col. 6, 11. 25-27. The portion of the top plate 120 including the top magnetic coil 122 extends vertically downward toward the wafer 104. See, e.g., FIG. 1.

Contrary to the insulating plate of claim 44, however, the protruding portion of the top plate 120 including the top magnetic coil 122 {identified as P1 in the portion of FIG. 1 shown below) does not include any "sloped surface." As noted above, this portion of the top plate 120 extends vertically downward. See, Berman at FIG. 1.

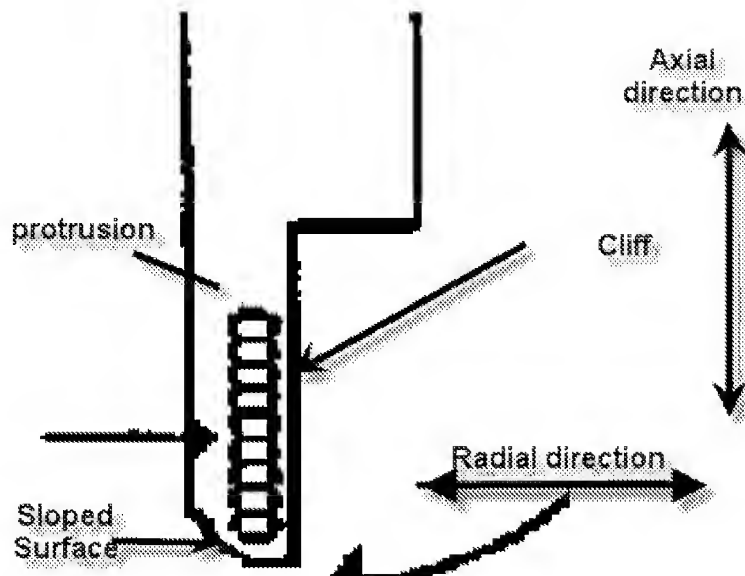
Moreover, the portion of the top plate 120 including the magnetic coil 122 protrudes in a direction perpendicular to a radial direction (also know as axial direction) of the top plate 120, but not "outwardly in a direction parallel to a radial direction," of the top plate 120, as required by claim 44, assuming arguendo that the top plate 120 corresponds to the "body," of claim 44 (which Applicants do not admit)."

The Examiner disagrees for the following reasons:

- a. Berman et al teaches an electrode 102 surrounding a wafer 104. The plasma is prevented from reaching the center of the substrate by an insulating top plate 120. Thus, Berman et al does teach an insulating plate.
- b. Berman et al teaches a protrusion, including a sloped surface and a cliff surface, the protrusion protruding outwardly in a direction parallel to a radial direction of the body. As can be seen below, the protrusion includes: a cliff, a

Art Unit: 1792

sloped surface, and extends in a radial direction.



Thus Berman et al teaches the claimed limitations.

2. In response to applicant's argument that Quon et al and Berman et al does not teach an insulating plate between a first and second electrode and exposing only the edge of the second electrode, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Berman et al clearly teaches using an insulating plate between electrodes to suppress plasma between the electrodes. Thus one of ordinary skill in the art seeking to limit the plasma to the edge of a substrate would be motivated to modify the apparatus of Quon et al to only expose the edge of the

substrate by adding the insulating plate taught by Berman et al.

Conclusion

3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrie R. Lund whose telephone number is (571) 272-1437. The examiner can normally be reached on Monday-Thursday (10:00 am - 9:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

Art Unit: 1792

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeffrie R. Lund/
Primary Examiner
Art Unit 1792

JRL
9/8/08